MITSUBISHI ELECTRIC

Changes for the Better

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

April 2012

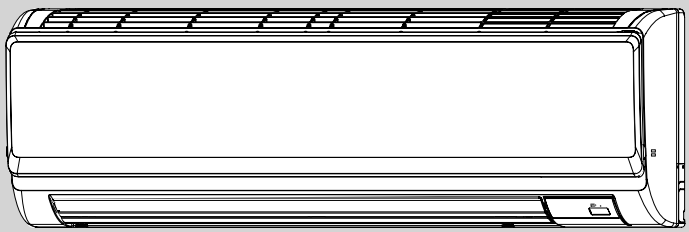
No. OCH515

TECHNICAL & SERVICE MANUAL

CITY MULTI Series Wall Mounted R410A / R22

Indoor unit [Model names]	[Service Ref.]
PKFY-P08NHMU-E2	PKFY-P08NHMU-E2
PKFY-P12NHMU-E2	PKFY-P12NHMU-E2
PKFY-P15NHMU-E2	PKFY-P15NHMU-E2
PKFY-P18NHMU-E2	PKFY-P18NHMU-E2

Note:
- This manual describes only service data of the indoor units.
- RoHS compliant products have <G> mark on the spec name plate.



INDOOR UNIT

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PARTS CATALOG (OCB515)

CITY MULTI

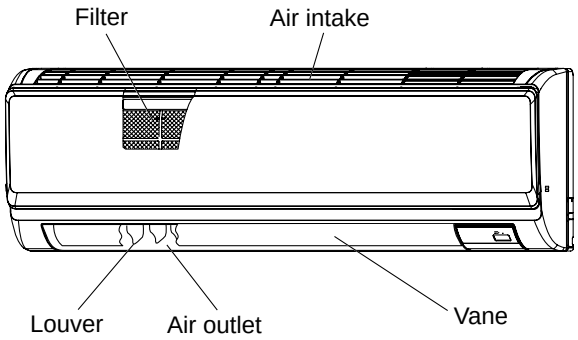
Use the specified refrigerant only

Never use any refrigerant other than that specified.

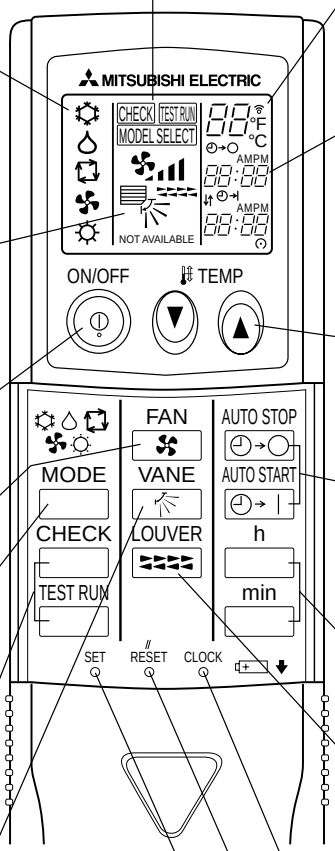
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

1 PART NAMES AND FUNCTIONS

● **Indoor unit**



● Wireless remote controller



CHECK TEST RUN display

CHECK and TEST RUN display indicate that the unit is being checked or test-run.

MODEL SELECT display

Blinks when model is selected.

display

Lights up while the signal is transmitted to the indoor unit when the button is pressed.

display

SET TEMP. display indicates the set desired temperature.

display

OPERATION MODE display
Operation mode display indicates which operation mode is in effect.

CLOCK display

Displays the current time.

TIMER display

Displays when in timer operation or when setting timer.

“ ↓ ” “ ↑ ” display

Displays the order of timer operation.

“ ⏲→| ” “ ⏲→○ ” display

Displays whether timer is on or off.

display

The vertical direction of air flow is indicated.

display

FAN SPEED display indicates which fan speed has been selected.

button

SET TEMPERATURE button sets any desired room temperature.

ON/OFF button

The unit is turned ON and OFF alternately each time the button is pressed.

TIMER CONTROL buttons

AUTO STOP (OFF timer): when this switch is set, the air conditioner will be automatically stopped at the preset time.
AUTO START (ON timer): when this switch is set, the air conditioner will be automatically started at the preset time.

FAN SPEED SELECT button

Used to change the fan speed.

h and min buttons

Buttons used to set the “hour and minute” of the current time and timer settings.

MODE SELECT button

Used to switch the operation mode between cooling, drying, fan, heating and auto mode.

※ In case the outdoor unit is cool only type, the heating and auto mode are not available.

LOUVER button

Changes left/right airflow direction.

(Not available for this model.)

CHECK-TEST RUN button

Only press this button to perform an inspection check or test operation.
Do not use it for normal operation.

CLOCK button

RESET button

SET button

VANE CONTROL button

Used to change the air flow direction.

• Wired remote controller

Note:
The phrase "Wired remote controller" in this manual refers only to the PAR-21MAA.
If you need any information for the other remote controller, please refer to either the installation manual or initial setting manual which are included in remote controller's box.

Display Section

For purposes of this explanation, all parts of the display are shown as lit. During actual operation, only the relevant items will be lit.

Day-of-Week
Shows the current day of the week.

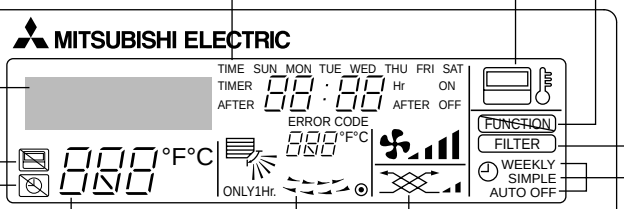
Time/Timer Display
Shows the current time, unless the simple or Auto Off timer is set.
If the simple or Auto Off timer is set, the time to be switched off is shown.

"Sensor" indication
Displayed when the remote controller sensor is used.

"Locked" indicator
Indicates that remote controller buttons have been locked.

"Clean The Filter" indicator
To be displayed on when it is time to clean the filter.

Identifies the current operation
Shows the operating mode, etc.
*Multilanguage display is available.



Timer indicators
The indicator comes on if the corresponding timer is set.

"Centrally Controlled" indicator
Indicates that operation from the remote controller has been prohibited by a master controller.

Fan Speed indicator
Shows the selected fan speed.

Up/Down Air Direction indicator
The indicator ↘ shows the direction of the outcoming airflow.

Room Temperature display
Shows the room temperature. The room temperature display range is 46–102°F. The display blinks if the temperature is less than 46°F or 102°F or more.

Ventilation indicator
Appears when the unit is running in Ventilation mode.

"Timer is Off" indicator
Indicates that the timer is off.

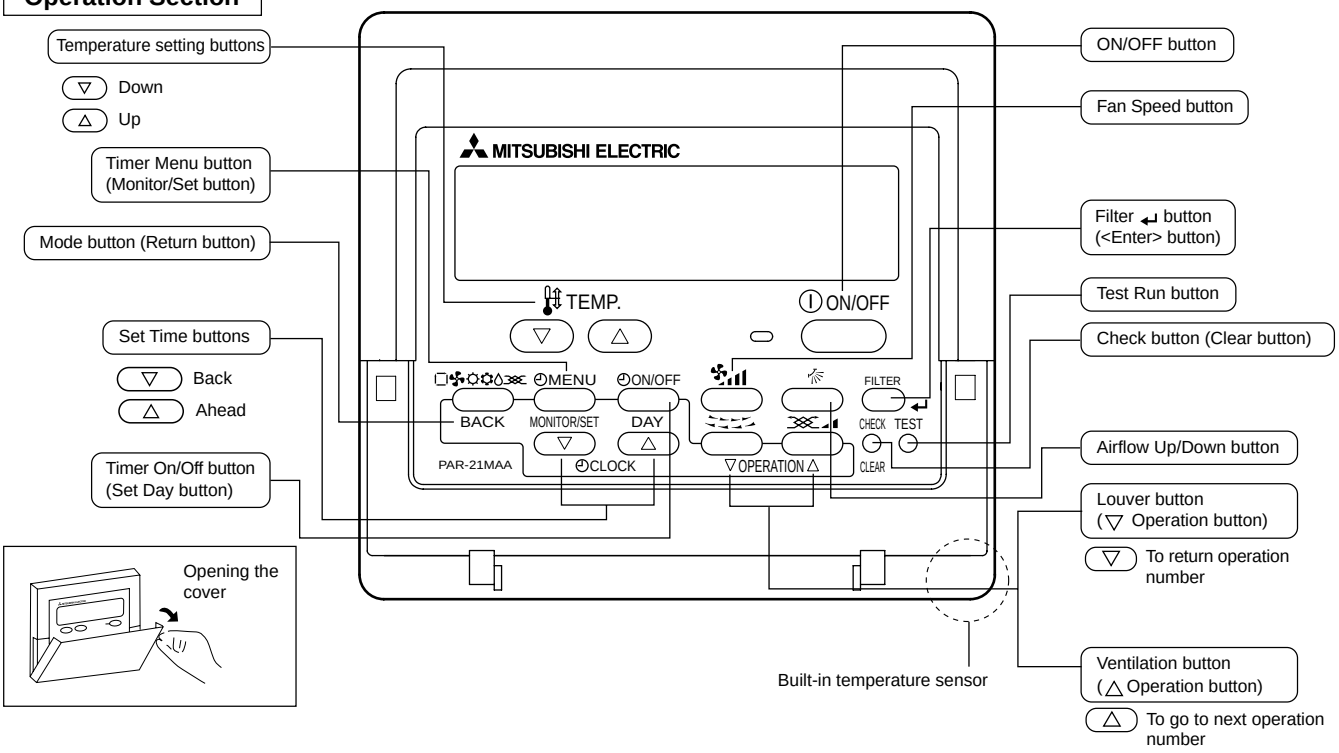
"One Hour Only" indicator
Displayed if the airflow is set to Low or downward during COOL or DRY mode. (Operation varies according to model.)
The indicator goes off in one hour, at which time the airflow direction also changes.

Louver display
Indicates the action of the swing louver. Does not appear if the louver is not running.

Temperature Setting
Shows the target temperature.

◉ (Power On indicator)
Indicates that the power is on.

Operation Section



2 SPECIFICATION

2-1. Specifications

Service Ref.			PKFY-P08NHMU-E2	PKFY-P12NHMU-E2	PKFY-P15NHMU-E2	PKFY-P18NHMU-E2
Power source			1-phase 208-230V 60Hz			
Cooling capacity (Nominal)	*1	kW	2.3	3.5	4.4	5.3
	*1	Btu/h	8,000	12,000	15,000	18,000
	Power input	kW	0.03	0.03	0.03	0.03
	Current input	A	0.30	0.30	0.30	0.30
Heating capacity (Nominal)	*2	kW	2.6	4.0	5.0	5.9
	*2	Btu/h	9,000	13,500	17,000	20,000
	Power input	kW	0.03	0.03	0.03	0.03
	Current input	A	0.30	0.30	0.30	0.30
External finish			Plastic, MUNSELL (1.0Y 9.2/0.2)			
External dimension H × W × D		mm	295 × 898 × 249			
		in.	11-5/8" × 35-3/8" × 9-13/16"			
Net weight		kg (lb)	13 (29)			
Heat exchanger			Cross fin (Aluminum fin and copper tube)			
Fan	Type × Quantity		Line flow fan × 1			
	External static press.	Pa	0			
		mmH_2O	0			
	Motor type		DC motor			
	Motor output	kW	0.030			
	Driving mechanism		Direct-drive			
	Airflow rate (Low-Mid-High)	m^3/min	9 - 10.5 - 11.7	9 - 10.5 - 11.7	9 - 10.5 - 11.7	9 - 10.5 - 12
		L/s	150 - 175 - 195	150 - 175 - 195	150 - 175 - 195	150 - 175 - 200
		cfm	320 - 370 - 413	320 - 370 - 413	320 - 370 - 413	320 - 370 - 425
Noise level (Low-Mid-High) (measured in anechoic room)		dB <A>	34 - 39 - 43	34 - 39 - 43	34 - 39 - 43	36 - 41 - 45
Insulation material			Polyethylene sheet			
Air filter			PP honeycomb			
Protection device			Fuse			
Refrigerant control device			LEV			
Connectable outdoor unit			R410A, R22 CITY MULTI			
Diameter of refrigerant pipe	Liquid (R410A)	mm (in.)	ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare
	(R22)		ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare	ø9.52 (ø3/8") Flare *3
	Gas (R410A)	mm (in.)	ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare
	(R22)		ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare	ø15.88 (ø5/8") Flare *3
Field drain pipe size		mm (in.)	I.D. 16mm (5/8")			
Standard attachment	Document		Installation Manual, Instruction Book			
	Accessory		—	—	—	—
Optional parts	External heater adapter		PAC-YU25HT			
Remarks	Installation		Details on foundation work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual.			

Note :

*1 Nominal cooling conditions

Indoor :	80°FDB/67°FWB (26.7°CDB/19.4°CWB)
Outdoor :	95°FDB (35°CDB)
Pipe length :	25 ft. (7.6 m)
Level difference :	0 ft (0 m)

*2 Nominal heating conditions

	70°FDB(21°CDB)
	47°FDB/43°FWB (8.3°CDB/6.1°CWB)
	25 ft. (7.6 m)
	0 ft (0 m)

*3 Connect the joint (purchased locally) for R22

* Due to continuing improvement, above specification may be subject to change without notice.

Unit converter

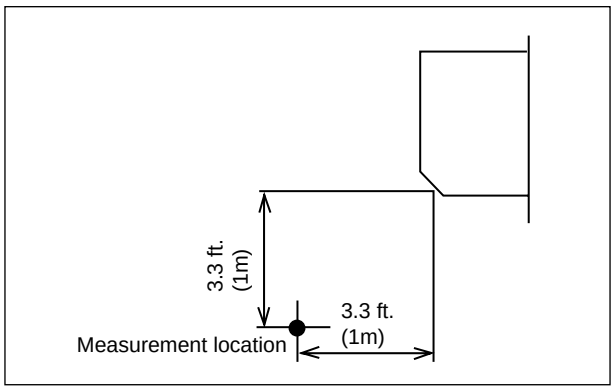
kcal/h = kW × 860
Btu/h = kW × 3,412
cfm = m^3/min × 35.31
lb = kg/0.4536

*Above specification data is subject to rounding variation.

2-2. Electrical parts specifications

Service Ref. / Parts name	Symbol	PKFY-P08NHMU-E2	PKFY-P12NHMU-E2	PKFY-P15NHMU-E2	PKFY-P18NHMU-E2
Room temperature thermistor	TH21	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ			
Liquid pipe thermistor	TH22	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ			
Gas pipe thermistor	TH23 TH24	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ			
Fuse (Indoor controller board)	FUSE	250V 3.15A			
Fan motor	MF	8-Pole Output 30W / RCOJ30-CK			
Vane motor (with limit switch)	MV	MSFBC20 DC12V			
Linear expansion valve	LEV	DC12V Stepping motor drive Port ϕ3.2 (0~2000pulse)			
Power supply terminal block	TB2	(L1, L2, GR) 250V 20A			
Transmission terminal block	TB5	(M1, M2, S) 250V 20A			
MA remote controller terminal block	TB15	(1, 2) 250V 10A			

2-3. Sound levels



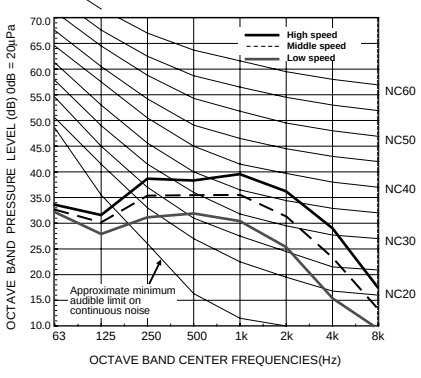
* Measured in anechoic room.

Sound level at anechoic room : Low-Middle-High

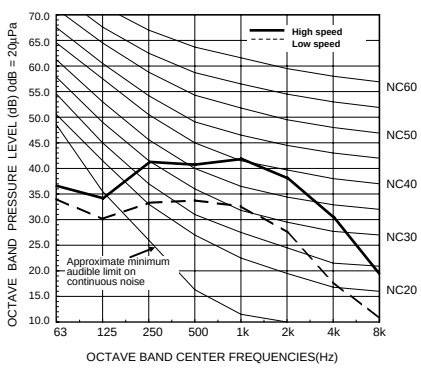
Service Ref.	Sound level dB (A)
PKFY-P08NHMU-E2 PKFY-P12NHMU-E2 PKFY-P15NHMU-E2	34-39-43
PKFY-P18NHMU-E2	36-41-45

2-4. NC curves

PKFY-P08, 12, 15NHMU-E2
External static pressure : 0Pa
Power source : 208,230V, 60Hz



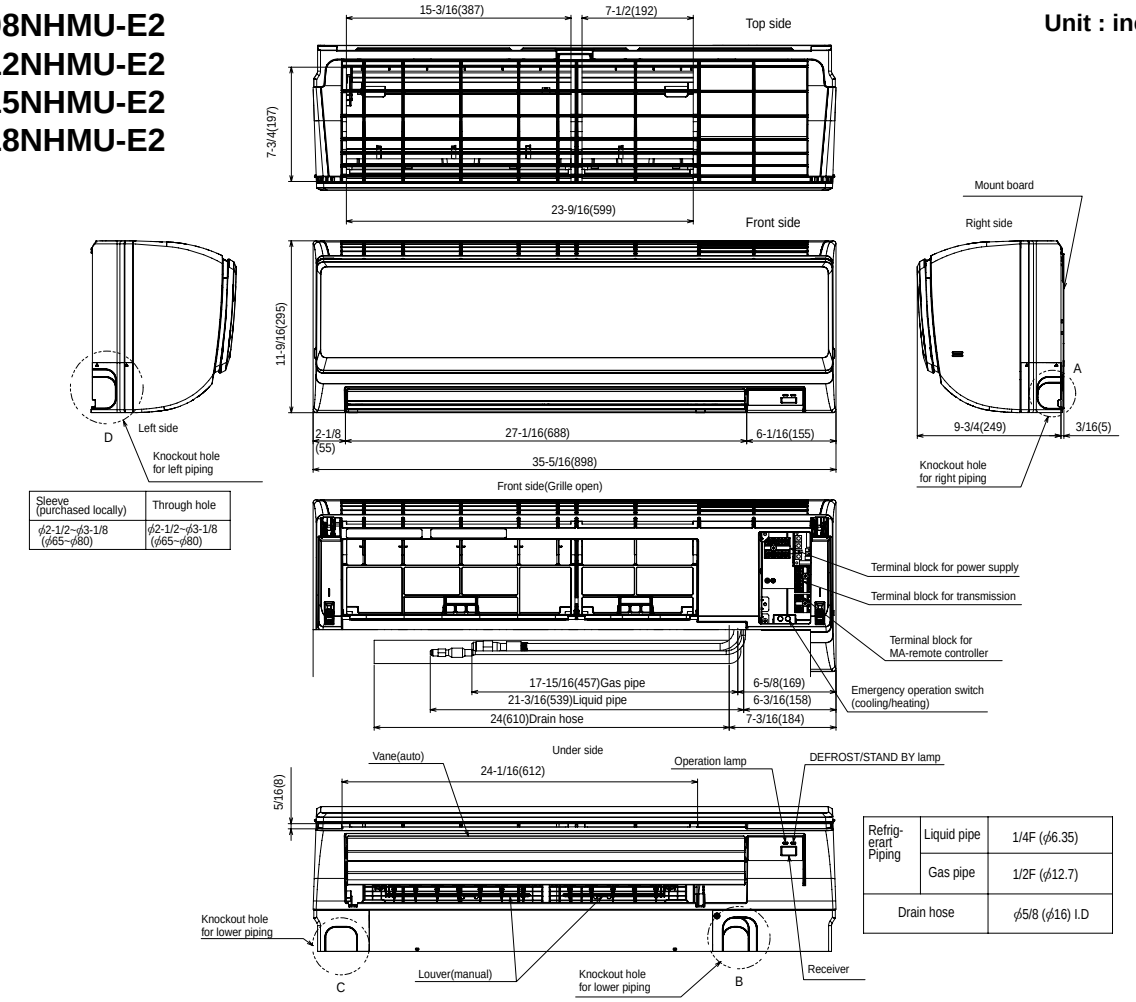
PKFY-P18NHMU-E2
External static pressure : 0Pa
Power source : 208,230V, 60Hz



3 OUTLINES AND DIMENSIONS

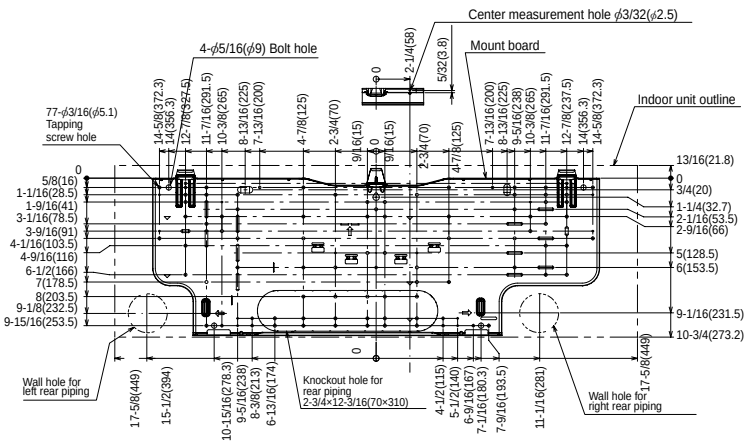
PKFY-P08NHMU-E2
PKFY-P12NHMU-E2
PKFY-P15NHMU-E2
PKFY-P18NHMU-E2

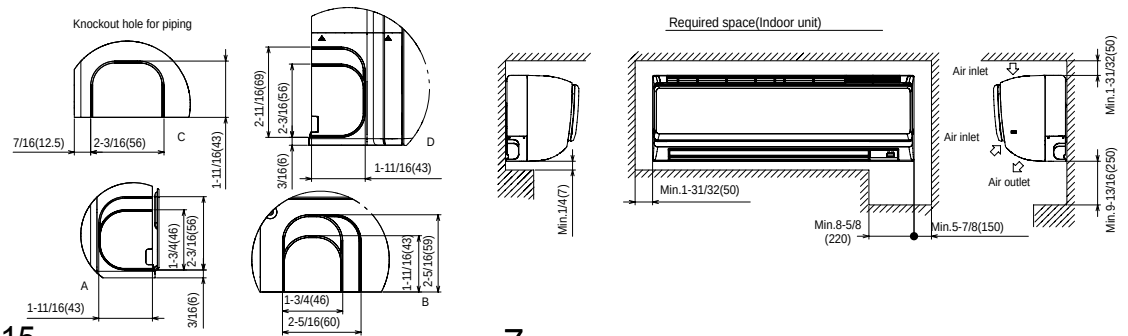
Unit : inch (mm)



Sleeve (purchased locally)	Through hole
ϕ2-1/2~ϕ3-1/8 (ϕ65~ϕ80)	ϕ2-1/2~ϕ3-1/8 (ϕ65~ϕ80)

Refrig-erart Piping	Liquid pipe	1/4F (ϕ6.35)
	Gas pipe	1/2F (ϕ12.7)
Drain hose		ϕ5/8 (ϕ16) I.D

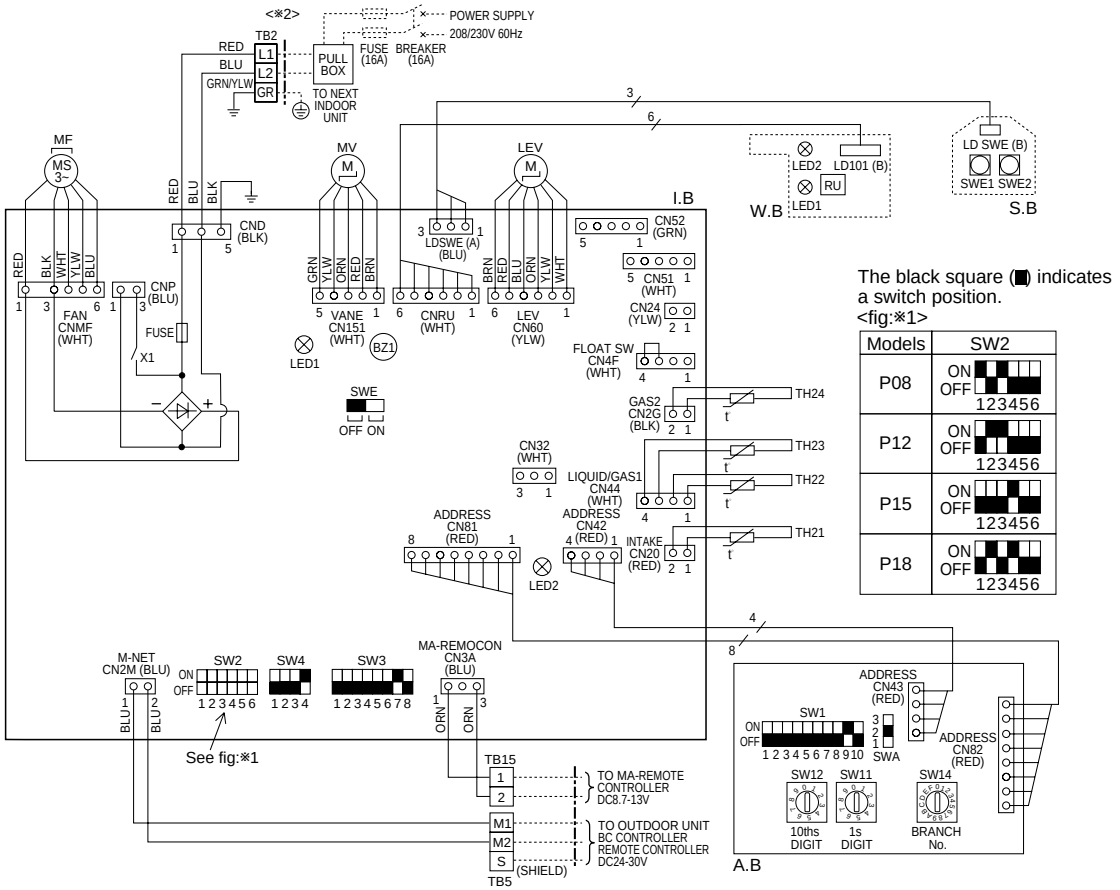




4 WIRING DIAGRAM

PKFY-P08NHMU-E2
PKFY-P12NHMU-E2
PKFY-P15NHMU-E2
PKFY-P18NHMU-E2

SYMBOL	NAME		SYMBOL	NAME	
I.B	INDOOR CONTROLLER BOARD		TH21	THERMISTOR	ROOM TEMP. DETECTION (32°F/15kΩ,77°F/5.4kΩ)
CN24	CONNECTOR	EXTERNAL HEATER			
CN32		REMOTE SWITCH	TH22		PIPE TEMP. DETECTION / LIQUID (32°F/15kΩ,77°F/5.4kΩ)
CN51		CENTRALLY CONTROL			
CN52		REMOTE INDICATION	TH23		PIPE TEMP. DETECTION / GAS1 (32°F/15kΩ,77°F/5.4kΩ)
BZ1	BUZZER				
FUSE	FUSE (T3.15AL 250V)		TH24		PIPE TEMP. DETECTION / GAS2 (32°F/15kΩ,77°F/5.4kΩ)
LED1	POWER SUPPLY (I.B)				
LED2	POWER SUPPLY (I.B)		A.B	ADDRESS BOARD	
SW2	SWITCH	CAPACITY CODE	SWA	SWITCH	FAN SPEED SELECTOR
SW3		MODE SELECTION	SW1		MODE SELECTION
SW4		MODEL SELECTOR	SW11		ADDRESS SETTING 1s DIGIT
SWE		DRAIN PUMP (TEST MODE)	SW12		ADDRESS SETTING 10ths DIGIT
X1	AUX.RELAY	DRAIN PUMP	SW14		BRANCH No.
LEV	LINEAR EXPANSION VALVE		S.B	SWITCH BOARD	
MF	FAN MOTOR		SWE1	EMERGENCY OPERATION(HEAT)	
MV	VANE MOTOR		SWE2	EMERGENCY OPERATION(COOL)	
TB2	TERMINAL BLOCK	POWER SUPPLY	W.B	PCB FOR WIRELESS REMOTE CONTROLLER	
TB5		TRANSMISSION	LED1	LED(OPERATION INDICATOR:GREEN)	
TB15		MA-REMOTE CONTROLLER	LED2	LED(OPERATION FOR HEATING :ORANGE)	
			RU	RECEIVING UNIT	



The black square (■) indicates a switch position.
<fig:※1>

Models	SW2
P08	ON OFF 123456
P12	ON OFF 123456
P15	ON OFF 123456
P18	ON OFF 123456

NOTES:
1.At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
2.In case of using MA-Remote controller, please connect to TB15.
(Remote controller wire is non-polar.)
3.In case of using M-NET, please connect to TB5. (Transmission line is non-polar.)
4.Symbol [S] of TB5 is the shield wire connection.
5.Symbols used in wiring diagram above are, □□□: terminal block, ○○○:connecter.
6.The setting of the SW2 dip switches differs in the capacity. For the detail, refer to the fig:※1.

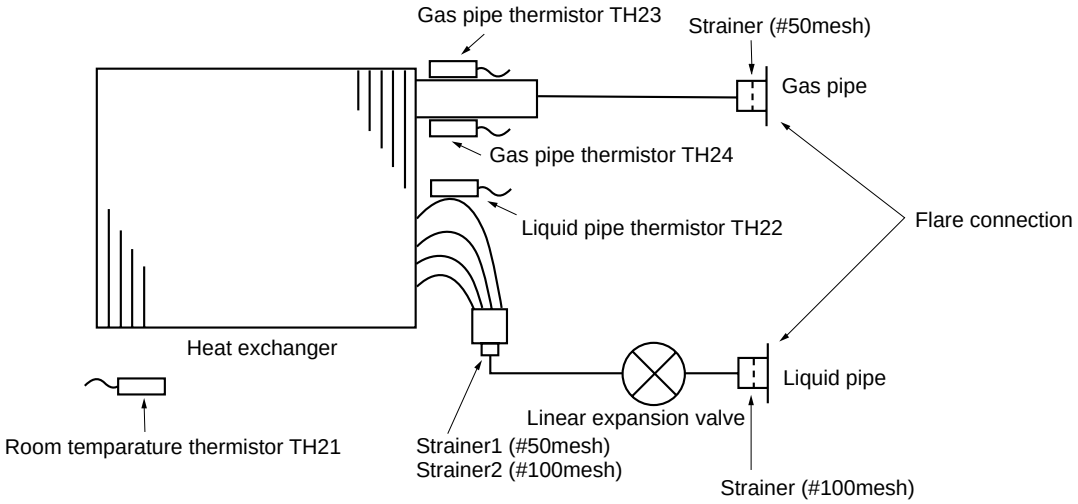
<※2>Use copper supply wires.

LED on indoor board for service

Mark	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit: 208-230V) Power on → lamp is lit
LED2	Power supply for MA-Remote controller	Power supply for MA-Remote controller on → lamp is lit

5 REFRIGERANT SYSTEM DIAGRAM

PKFY-P08NHMU-E2
PKFY-P12NHMU-E2
PKFY-P15NHMU-E2
PKFY-P18NHMU-E2

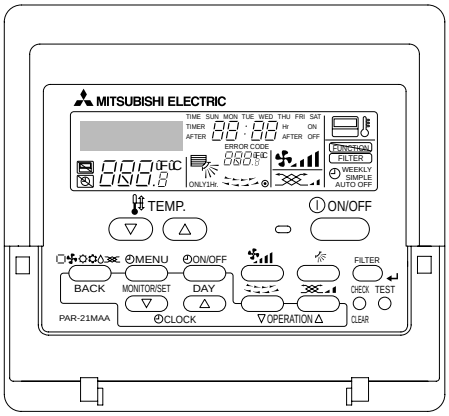


Unit : mm (inch)

Service Ref. / Item	PKFY-P08,12,15,18NHMU-E2
Gas pipe	ϕ12.7(1/2)
Liquid pipe	ϕ6.35(1/4)

6 MICROPROCESSOR CONTROL

INDOOR UNIT CONTROL
6-1. COOL OPERATION

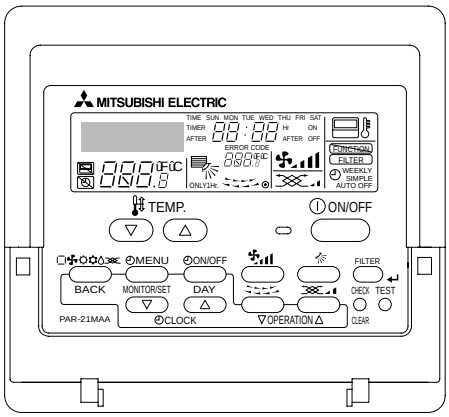


<How to operate>

①Press POWER ON/OFF button.
②Press the operation MODE button to display COOL.
③Press the TEMP. button to set the desired temperature.
NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed one time. Cooling 67 to 87°F

Control modes	Control details	Remarks
1. Thermostat function	1-1. Thermostat function (Function to prevent restarting for 3 minutes) • Room temperature ≧ desired temperature + 2°F ···Thermo ON • Room temperature ≦ desired temperature ···Thermo OFF	
	1-2. Anti-freezing control Detected condition : When the liquid pipe temp. (TH22) is 32°F or less in 16 minutes from compressors start up, anti-freezing control starts and the thermo OFF. Released condition : The timer which prevents reactivating is set for 3 minutes, and anti-freezing control is cancelled when any one of the following conditions is satisfied. ① Liquid pipe temp. (TH22) turns 50°F or above. ② The condition of the thermo OFF has become complete by thermostat, etc. ③ The operation modes became mode other than COOL. ④ The operation stopped.	
2. Fan	By the remote controller setting (switch of 3 speeds+Auto) Type: 3 speeds + Auto type — Fan speed notch: [Low], [Mid], [High], [Auto] When [Auto] is set, fan speed is changed depending on the value of: Room temperature - Desired temperature	
3. Vane (up/down vane change)	(1) Initial setting: Start at COOL mode and horizontal vane. (2) Vane position: Horizontal →Downward A →Downward B →Downward C→Downward D→Swing→Auto (3) Restriction of the downward vane setting When setting the downward vane A, B, C or D in [Mid], [Low] or [Auto] of the fan speed notch, the vane changes to horizontal position after 1 hour have passed.	· "ONLY 1 Hr" appears on the wired remote controller.

6-2. DRY OPERATION



<How to operate>

①Press POWER ON/OFF button.

②Press the operation MODE button to display DRY.

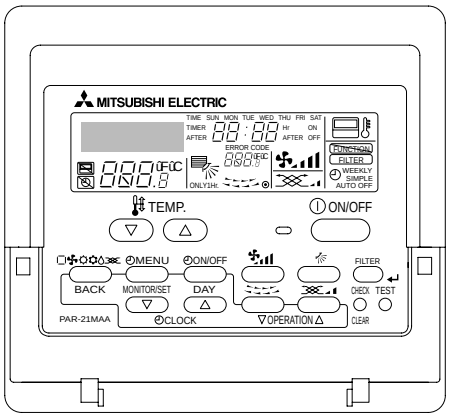
③Press the TEMP. button to set the desired temperature.

NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed one time. Dry 67 to 87°F

<table>
<tr><th>Control modes</th><th>Control details</th><th>Remarks</th></tr>
<tr><td>1. Thermostat function</td><td>1-1. Thermostat function (Function to prevent restarting for 3 minutes)
Setting the Dry thermo by the thermostat signal and the room temperature (TH21).

Dry thermo ON Room temperature ≧ desired temperature + 2°F
Dry thermo OFF Room temperature ≧ desired temperature
<table>
<tr><td rowspan="2">Room temperature</td><td colspan="2">3 min. passed since starting operation</td><td rowspan="2">Dry thermo ON time (min)</td><td rowspan="2">Dry thermo OFF time (min)</td></tr>
<tr><td>Thermostat signal</td><td>Room temperature (T1)</td></tr>
<tr><td rowspan="5">Over 64°F</td><td rowspan="4">ON</td><td>T1≧ 83°F</td><td>9</td><td>3</td></tr>
<tr><td>83°F > T1 ≧ 79°F</td><td>7</td><td>3</td></tr>
<tr><td>79°F > T1 ≧ 75°F</td><td>5</td><td>3</td></tr>
<tr><td>75°F > T1</td><td>3</td><td>3</td></tr>
<tr><td>OFF</td><td>Unconditional</td><td>3</td><td>10</td></tr>
<tr><td>Less than 64°F</td><td colspan="4">Dry thermo OFF</td></tr>
</table>
1-2. Freeze prevention control
No control function</td><td></td></tr>
<tr><td>2. Fan</td><td>Indoor fan operation controlled depending on the compressor conditions.
<table>
<tr><td>Dry thermo</td><td colspan="2">Fan speed notch</td></tr>
<tr><td>ON</td><td colspan="2">[Low]</td></tr>
<tr><td rowspan="2">OFF</td><td>Excluding the following</td><td>Stop</td></tr>
<tr><td>Room temp. < 64°F</td><td>[Low]</td></tr>
</table>
Note: Remote controller setting is not acceptable.</td><td></td></tr>
<tr><td>3. Vane
(up/down vane change)</td><td>Same control as COOL operation</td><td></td></tr>
</table>

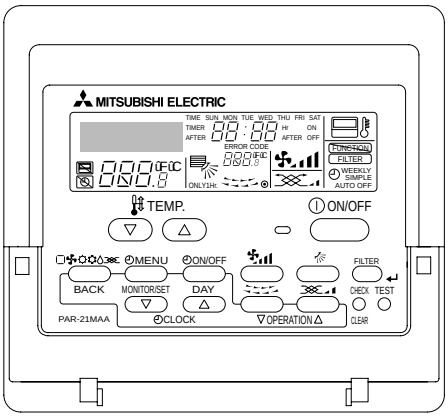
6-3. FAN OPERATION



<How to operate>
①Press POWER ON/OFF button.
②Press the operation MODE button to display FAN.

Control modes	Control details	Remarks
1. Fan	Set by remote controller. Type: 3 speeds + Auto type; Fan speed notch: [Low], [Mid], [High], [Auto] When [Auto] is set, fan speed becomes [Low].	
2. Vane (up/down vane change)	Same as the control performed during the COOL operation, but with no restriction on the vane's downward blow setting	· Same control as COOL operation

6-4. HEAT OPERATION



<How to operate>

①Press POWER ON/OFF button.

②Press the operation MODE button to display HEAT.

③Press the TEMP. button to set the desired temperature.

NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed one time. Heating 63 to 83°F.

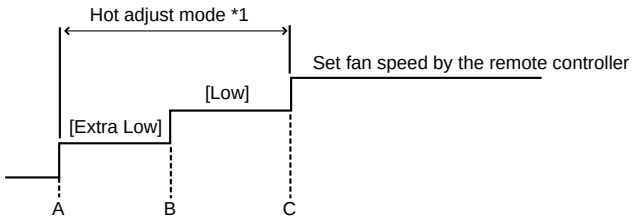
<Display in HEAT operation>

[DEFROST]

The [DEFROST] symbol is only displayed during the defrost operation.

[STANDBY]

The [STANDBY] symbol is only displayed during the hot adjust mode.

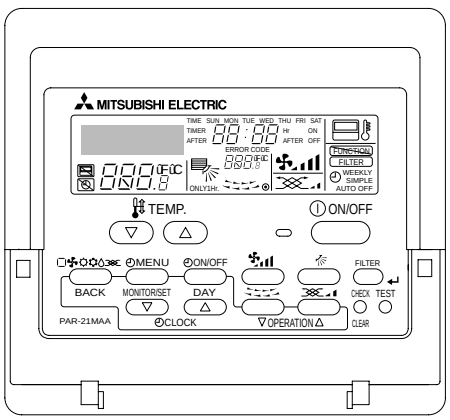
Control modes	Control details	Remarks
1. Thermostat function	1-1. Thermostat function (Function to prevent restarting for 3 minutes) • Room temperature ≦ desired temperature -2°F ···Thermo ON • Room temperature ≦ desired temperature ···Thermo OFF	
2. Fan	By the remote controller setting (switch of 3 speeds+Auto) Type: 3 speeds + Auto type — Fan speed notch: [Low], [Mid], [High], [Auto] When [Auto] is set, fan speed is changed depending on the value of: Desired temperature - Room temperature Give priority to under-mentioned controlled mode 2-1. Hot adjust mode 2-2. Residual heat exclusion mode 2-3. Thermo OFF mode (When the compressor off by the thermostat) 2-4. Cool air prevention mode (Defrosting mode)	
	2-1. Hot adjust mode The fan controller becomes the hot adjuster mode for the following conditions. ①When starting the HEAT operation ②When the thermostat function changes from OFF to ON. ③When release the HEAT defrosting operation  A: Hot adjust mode starts. B: 5 minutes have passed since the condition A or the indoor liquid pipe temperature turned 95°F or more. C: 2 minutes have passed since the condition B. (Terminating the hot adjust mode)	*1 "STAND BY" will be displayed during the hot adjust mode.
	2-2. Residual heat exclusion mode When the condition changes the auxiliary heater ON to OFF (thermostat or operation stop, etc), the indoor fan operates in [Low] mode for 1 minute.	· This control is same for the model without auxiliary heater.

To be continued on the next page.

From the preceding page

Control modes	Control details	Remarks
2. Fan	2-3. Thermo OFF mode When the thermostat function changes to OFF, the indoor fan operates in [Extra low].	
	2-4. Heat defrosting mode The indoor fan stops.	
3. Vane control (Up/down vane change)	(1) Initial setting: OFF → HEAT···[last setting] When the last setting is [Swing] ··· [Downward D] When changing the mode from exception of HEAT to HEAT operation ···[Downward D] (2) Vane position: Horizontal →Downward A →Downward B →Downward C→Downward D→Swing→Auto (3) Restriction of vane position ① The vane is horizontally fixed for the following modes. (The control by the remote controller is temporally invalidated and control by the unit.) •Thermo OFF •Hot adjust [Extra low] mode •Heat defrost mode	

6-5. AUTO OPERATION [AUTOMATIC COOL/HEAT CHANGE OVER OPERATION]

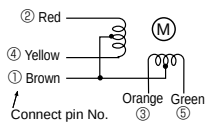
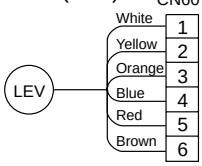


<How to operate>
①Press POWER ON/OFF button.
②Press the operation MODE button to display AUTO.
③Press the TEMP. button to set the desired temperature.
NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed one time. Automatic 67 to 83°F

Control modes	Control details	Remarks
1. Initial value of operation mode	HEAT mode for room temperature < Desired temperature COOL mode for room temperature ≧ Desired temperature	
2. Mode change	(1) HEAT mode → COOL mode Room temperature ≧ Desired temperature + 3°F. or 3 min. has passed (2) COOL mode → HEAT mode Room temperature ≧ Desired temperature - 3°F. or 3 min. has passed	
3. COOL mode	Same control as cool operation	
4. HEAT mode	Same control as heat operation	

7 TROUBLESHOOTING

7-1. HOW TO CHECK THE PARTS
PKFY-P08, 12, 15, 18NHMU-E2

Parts name	Check points
Room temperature thermistor (TH21) Liquid pipe temperature thermistor (TH22) Gas pipe temperature thermistor (TH23 ,24)	Disconnect the connector then measure the resistance with a tester. (At the ambient temperature 50°F~86°F) Normal: 4.3kΩ~9.6kΩ / Abnormal: Open or short Refer to the next page for the details.
Vane motor (MV) 	Measure the resistance between the terminals with a tester. (Coil temperature 77°F) Normal: ①-② Brown-Red; ①-③ Brown-Orange; ①-④ Brown-Yellow; ①-⑤ Brown-Green; 350Ω ± 7% Abnormal: Open or short
Fan motor (MF)	Refer to 7-1-3.
Linear expansion valve (LEV) 	Disconnect the connector then measure the resistance value with a tester. (Coil temperature 68°F) Normal: (1)-(5) White-Red; (2)-(6) Yellow-Brown; (3)-(5) Orange-Red; (4)-(6) Blue-Brown; 200Ω ± 10% Abnormal: Open or short

7-1-1. Thermistor

<Thermistor characteristic graph>

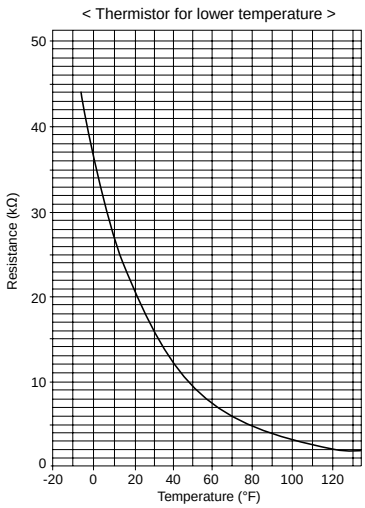
Thermistor for lower temperature

Room temperature thermistor (TH21)
Liquid pipe temperature thermistor (TH22)
Gas pipe temperature thermistor (TH23) (TH24)

Thermistor R_0=15kΩ ± 3%
Fixed number of B=3480 ± 2%

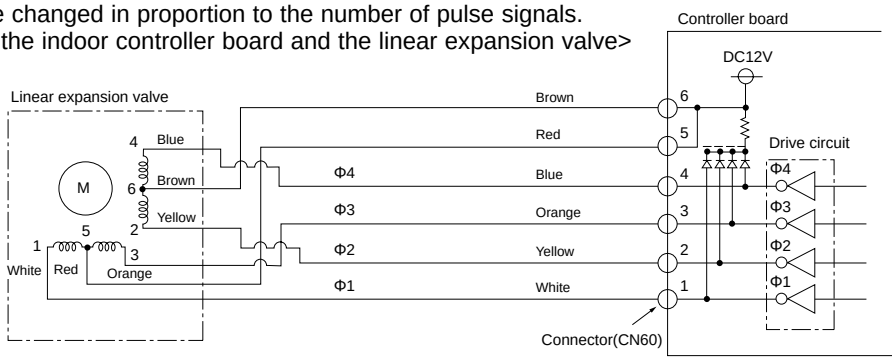
$$Rt=15\exp\{3480(\frac{1}{273+(t-32)/1.8}-\frac{1}{273})\}$$

30°F	15.8kΩ
50°F	9.6kΩ
70°F	6.0kΩ
80°F	4.8kΩ
90°F	3.9kΩ
100°F	3.2kΩ



7-1-2. Liner expansion valve

① Operation summary of the linear expansion valve
• Linear expansion valve open/close through stepping motor after receiving the pulse signal from the indoor controller board.
• Valve position can be changed in proportion to the number of pulse signals.
<Connection between the indoor controller board and the linear expansion valve>



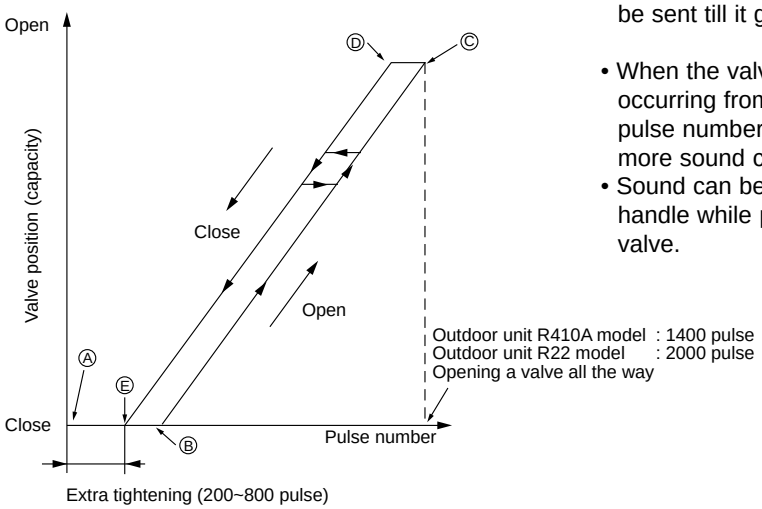
<Output pulse signal and the valve operation>

Output (Phase)	Output			
	1	2	3	4
ϕ1	ON	OFF	OFF	ON
ϕ2	ON	ON	OFF	OFF
ϕ3	OFF	ON	ON	OFF
ϕ4	OFF	OFF	ON	ON

Closing a valve : 1 → 2 → 3 → 4 → 1
Opening a valve : 4 → 3 → 2 → 1 → 4
The output pulse shifts in above order.

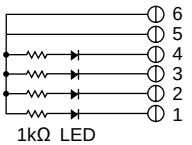
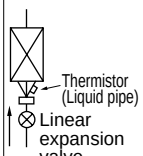
Note:
- When linear expansion valve operation stops, all output phase become OFF.
- At phase interruption or when phase does not shift in order, motor does not rotate smoothly and motor will lock and vibrate.

② Linear expansion valve operation



- When the switch is turned on, 2200 pulse closing valve signal will be sent till it goes to point Ⓐ in order to define the valve position.
- When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valves, however, when the pulse number moves from Ⓔ to Ⓐ or when the valve is locked, more sound can be heard than in a normal situation.
- Sound can be detected by placing the ear against the screw driver handle while putting the screw driver tip to the linear expansion valve.

③ Troubleshooting

Symptom	Check points	Countermeasures
Operation circuit failure of the micro processor	Disconnect the connector on the controller board, then connect LED for checking.  When power is turned on, pulse signals will be output for 10 seconds. There must be some defects in the operation circuit if the LED does not light while the signals are output or keeps lighting even after the signals stop.	Exchange the indoor controller board at drive circuit failure.
Linear expansion valve mechanism is locked.	Motor will idle and make a ticking noise when the motor is operated while the linear expansion valve is locked. This ticking sound is the sign of the abnormality.	Exchange the linear expansion valve.
Short or breakage of the motor coil of the linear expansion valve	Measure the resistance between each coil (white-red, yellow-brown, orange-red, blue-brown) with a tester. It is normal if the resistance is in the range of 200Ω ±10%.	Exchange the linear expansion valve.
Valve does not close completely.	To check the linear expansion valve, operate the indoor unit in fan mode and at the same time operate other indoor units in cooling mode, then check the pipe temperature <liquid pipe temperature> of the indoor unit by the outdoor multi controller board operation monitor. During fan operation, linear expansion valve is closed completely and if there is any leaking, detecting temperature of the thermistor will go lower. If the detected temperature is much lower than the temperature indicated in the remote controller, it means the valve is not closed all the way.  It is not necessary to exchange the linear expansion valve, if the leakage is small and not affecting normal operation.	If large amount of refrigerant is leaked, exchange the linear expansion valve.
Wrong connection of the connector or contact failure	Check the color of lead wire and missing terminal of the connector.	Disconnect the connector at the controller board, then check the continuity.

7-1-3. DC Fan motor (fan motor/indoor controller circuit board)

Check method of DC fan motor (fan motor/indoor controller circuit board)

① Notes

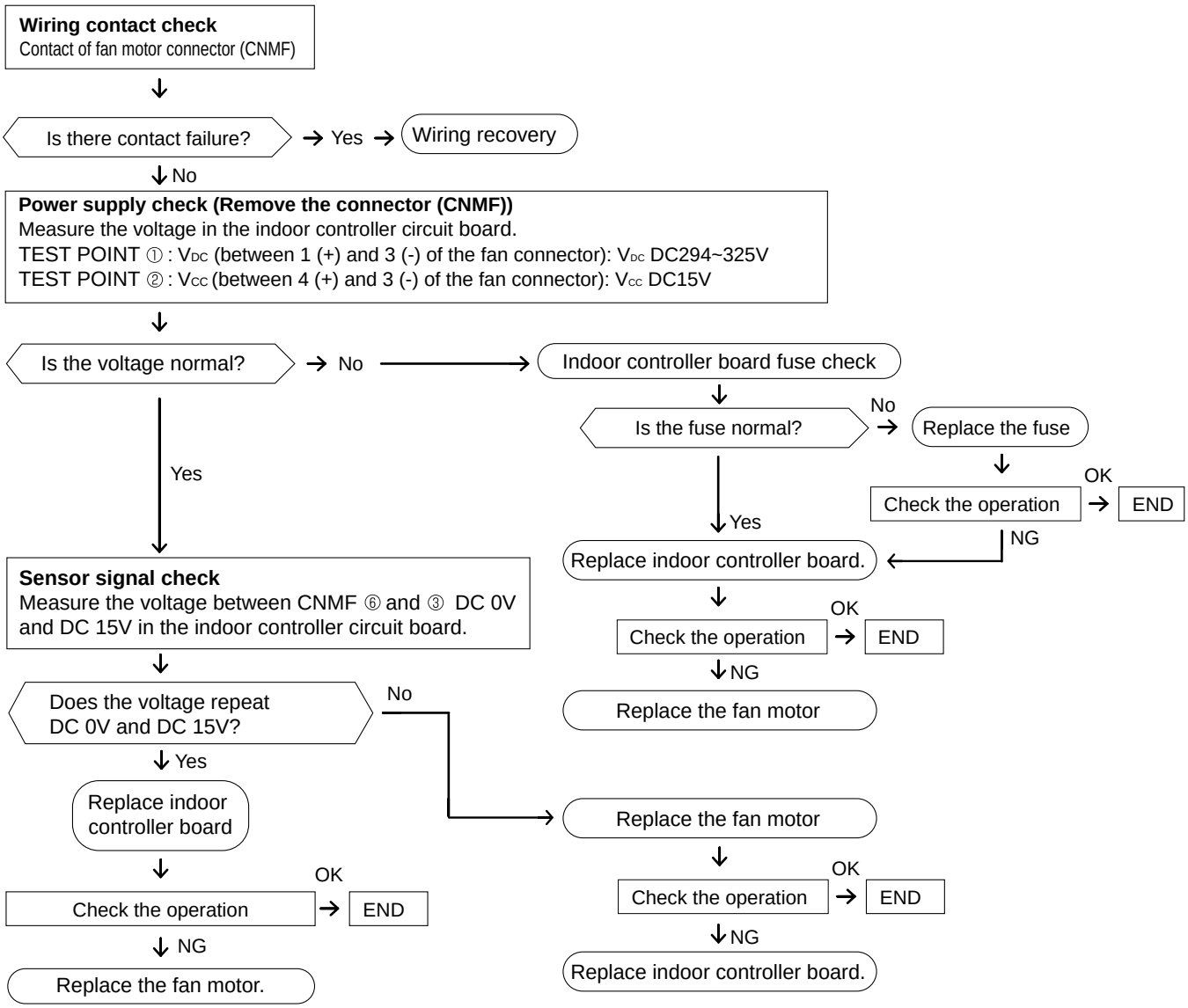
· High voltage is applied to the connecter (CNMF) for the fan motor. Pay attention to the service.

· Do not pull out the connector (CNMF) for the motor with the power supply on.

(It causes trouble of the indoor controller circuit board and fan motor.)

② Self check

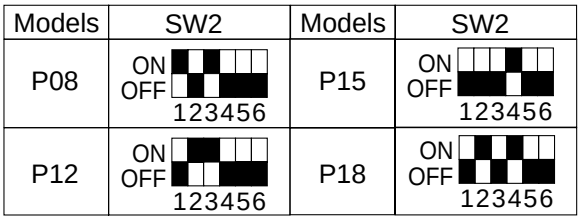
Symptom : The indoor fan cannot turn around.

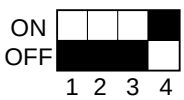


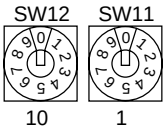
7-2. Function of Dip switch

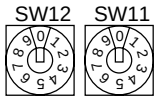
PKFY-P08NHMU-E2 PKFY-P12NHMU-E2
PKFY-P15NHMU-E2 PKFY-P18NHMU-E2

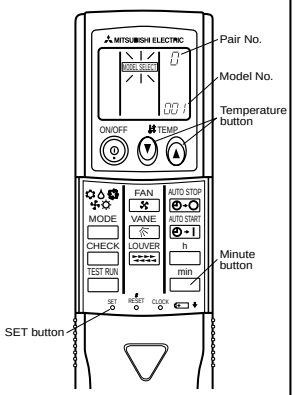
<table>
<tr><th>Switch</th><th>Pole</th><th>Function</th><th colspan="2">Operation by switch</th><th>Effective timing</th><th>Remarks</th></tr>
<tr><th></th><th></th><th></th><th>ON</th><th>OFF</th><th></th><th></th></tr>
<tr><td rowspan="10">SW1
Mode selection</td><td>1</td><td>Thermistor<Room temperature> position</td><td>Built-in remote controller</td><td>Indoor unit</td><td rowspan="10">Under suspension</td><td rowspan="10">Address board
<Initial setting>

NOTE:
※1
SW1-7 / SW1-8 / Fan speed
OFF / OFF / Extra low
ON / OFF / Low
OFF / ON / Setting air flow
ON / ON / Stop
※2 It is impossible to intake the fresh air.</td></tr>
<tr><td>2</td><td>Filter clogging detection</td><td>Provide</td><td>Not provide</td></tr>
<tr><td>3</td><td>Filter cleaning sign</td><td>2,500 hr</td><td>100 hr</td></tr>
<tr><td>4</td><td>Fresh air intake ※2</td><td>Not effective</td><td>Not effective</td></tr>
<tr><td>5</td><td>Switching remote controller display</td><td>Thermo ON signal indication</td><td>Fan output indication</td></tr>
<tr><td>6</td><td>Humidifier control</td><td>Fan operation at Heating mode</td><td>Thermo ON operation at heating mode</td></tr>
<tr><td>7</td><td rowspan="2">Air flow set in case of heat thermo OFF</td><td>Low ※1</td><td>Extra low ※1</td></tr>
<tr><td>8</td><td>Setting air flow ※1</td><td>Depends on SW1-7</td></tr>
<tr><td>9</td><td>Auto restart function</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>10</td><td>Power ON/OFF by breaker</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>SW2
Capacity code switch</td><td>1~6</td><td colspan="3"> 
</td><td>Before power supply ON</td><td>Indoor controller board</td></tr>
<tr><td rowspan="8">SW3
Function selection</td><td>1</td><td>Heat pump/Cool only</td><td>Cooling only</td><td>Heat pump</td><td rowspan="8">Under suspension</td><td rowspan="8">Indoor controller board
<Initial setting>

※1 Second setting is same as first setting.
※2 Please do not use SW3-7,8 as trouble might be caused by the usage condition.</td></tr>
<tr><td>2</td><td>Not used</td><td>—</td><td>—</td></tr>
<tr><td>3</td><td>Not used</td><td>—</td><td>—</td></tr>
<tr><td>4</td><td>Vane horizontal angle</td><td>Second setting ※1</td><td>First setting</td></tr>
<tr><td>5</td><td>Changing the opening of linear expansion valve during thermo OFF</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>6</td><td>Heating 4 degree up</td><td>Not effective</td><td>Effective</td></tr>
<tr><td>7</td><td>Target superheat setting ※2</td><td>—</td><td>—</td></tr>
<tr><td>8</td><td>Target subcool ※2</td><td>—</td><td>—</td></tr>
<tr><td>SW4
Model selection</td><td>1~4</td><td colspan="3">In case of replacing the indoor controller board, make sure to set the switch to the initial setting, which is shown below.
 
</td><td>Before power supply ON</td><td>Indoor controller board</td></tr>
</table>

<table>
<tr><th>Switch</th><th></th><th>Operation by switch</th><th>Effective timing</th><th>Remarks</th></tr>
<tr><td>SW11
1s digit address setting
SW12
10ths digit address setting</td><td>Rotary Switch</td><td> 

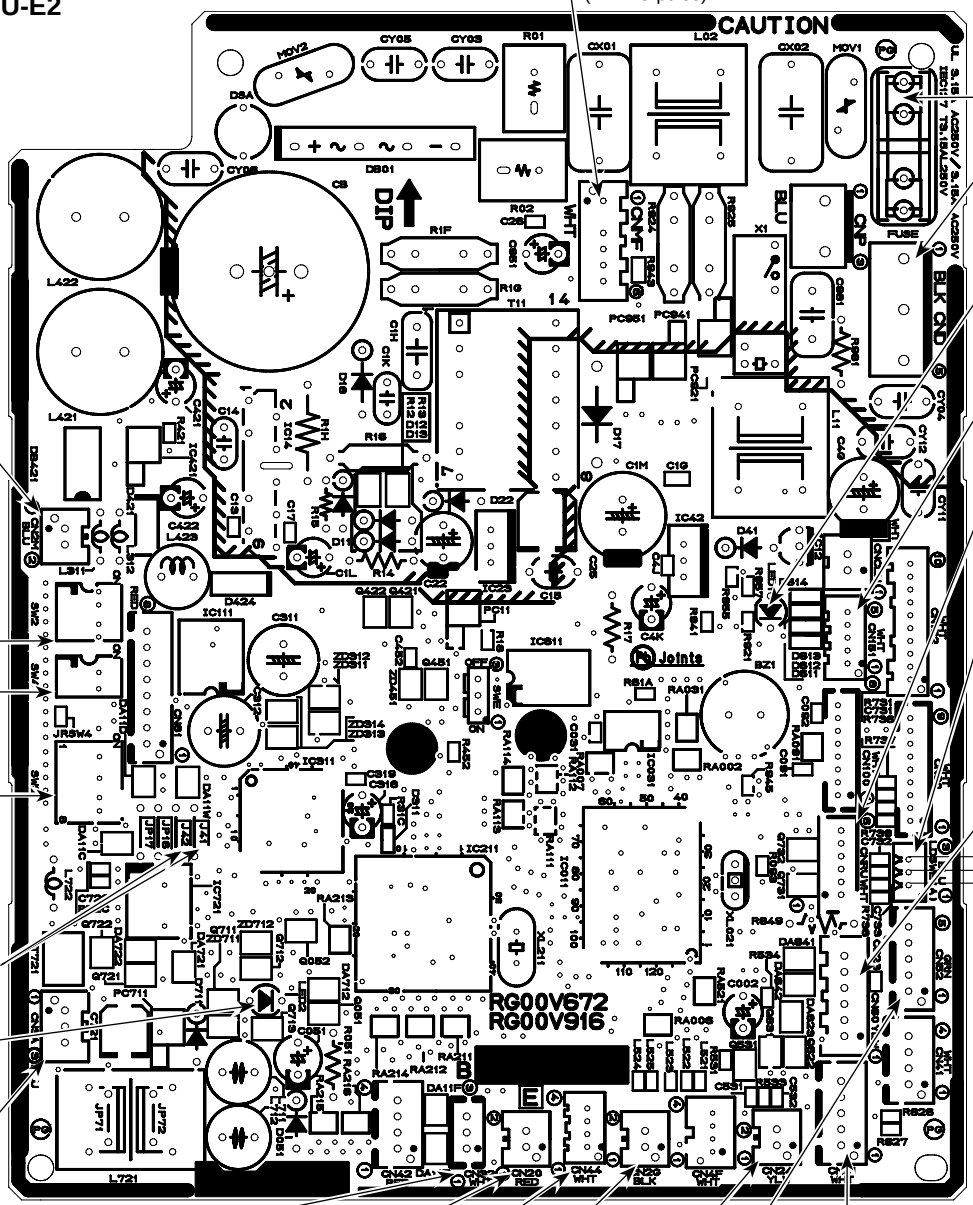
How to set addresses
Example : If address is "3", remain SW12 (for over 10) at "0", and match SW11 (for 1 to 9) with "3".</td><td rowspan="2">Before power supply ON</td><td>Address board
<Initial setting>
 
</td></tr>
<tr><td>SW14
Branch No. Setting</td><td>Rotary switch</td><td>

How to set branch numbers SW14 (Series R2 only)
Match the indoor unit's refrigerant pipe with the BC controller's end connection number.
Remain other than series R2 at "0".</td><td>Address board
<Initial setting>
</td></tr>
<tr><td>J41, J42
Wireless remote controller Pair No.</td><td>Jumper</td><td>• To operate each indoor unit by each remote controller when installed 2 indoor units or more are near, Pair No. setting is necessary.
● Pair No. setting is available with the 4 patterns (Setting patterns A to D).
● Make setting for J41, J42 of indoor controller board and the Pair No. of wireless remote controller.
• You may not set it when operating it by one remote controller.
● Setting for indoor unit
Cut jumper wire J41, J42 on the indoor controller board according to the table below.
● Wireless remote controller pair number:
Setting operation
1. Press the SET button (using a pointed implement). Check that the remote controller's display has stopped before continuing.
MODEL SELECT flashes, and the model No. (3 digits) appears (steadily-lit).
2. Press the MINUTE button twice. The pair number appears flashing.
3. Press the temperature ▼ ▲ buttons to select the pair number to set.
4. Press the SET button (using a pointed implement). The set pair number is displayed (steadily-lit) for 3 seconds, then disappears.
<table>
<tr><th rowspan="2">Setting pattern</th><th colspan="2">Indoor controller jumper wire</th><th rowspan="2">Pair No. of wireless remote controller※</th><th rowspan="2"></th></tr>
<tr><th>J41</th><th>J42</th></tr>
<tr><td>A</td><td>—</td><td>—</td><td>0</td><td>Initial setting</td></tr>
<tr><td>B</td><td>Cut</td><td>—</td><td>1</td><td>—</td></tr>
<tr><td>C</td><td>—</td><td>Cut</td><td>2</td><td>—</td></tr>
<tr><td>D</td><td>Cut</td><td>Cut</td><td>3</td><td>—</td></tr>
</table>
※ Pair No.4-9 of wireless remote controller is setting pattern D.</td><td>Under operation or suspension</td><td><Initial setting>
Pattern A
 
</td></tr>
</table>

7-3. TEST POINT DIAGRAM

7-3-1. Indoor controller board

PKFY-P08NHMU-E2
PKFY-P12NHMU-E2
PKFY-P15NHMU-E2
PKFY-P18NHMU-E2



CNMF
Connect to the fan motor (MF)
①-③ : DC294~325V
④-③ : DC15V
⑤-③ : DC0~6V
⑥-③ : DC0 or DC15V (Stop)
DC7.5V (Operation)
(12VDC pulse)

FUSE
3.15A 250V

CND
Power supply for indoor controller board
①-③ : 208/230VAC

LED1
Main power supply (Indoor unit : 208/230VAC)

CN151
Vane motor output
12VDC pulse output

CNRU
Connect to the wireless remote controller board (W.B)

LDSWE(A)
Connect to the wireless remote controller board (S.B)

CN60
Liner expansion valve (LEV) output
12VDC pulse output

CN2M
Connect to the terminal block (TB5) (M-NET transmission connecting wire)
24-30VDC (non-polar)
Power supply from outdoor unit

SW2
Capacity setting

SW4
Model selection

SW3
Function setting

Jumper wire J41, J42
Pair No. setting for wireless remote controller

LED2
Power supply for MA-Remote controller

CN3A
Connected to the terminal block (TB15) (MA-Remote controller connecting wire)
① - ③ : 8.7-13V DC
(Pin① (+))

CN32
Remote switch

CN20
Room temperature thermistor (TH21)

CN44
Pipe temperature thermistor
①-② : Liquid (TH22)
③-④ : Gas1 (TH23)

CN2G
Pipe temperature thermistor
Gas2 (TH24)

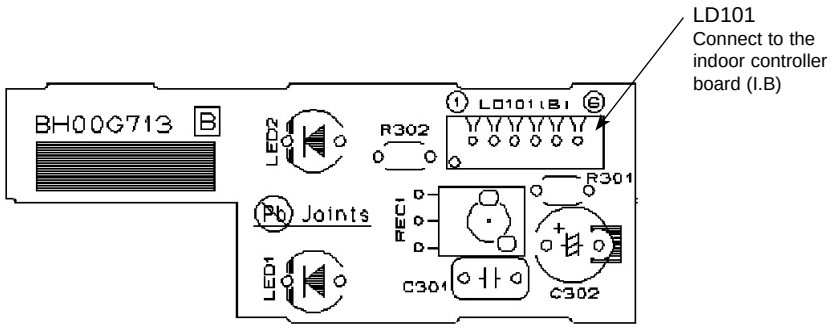
CN24
External heater
12VDC (① : +)

CN52
Remote indicator
①-②: Status lamp 12VDC (① : +)
Fan motor output (SW1-5 OFF)
Thermostat ON (SW1-5 ON)
①-③: Cooling/Dry status lamp
12VDC (① : +)
①-④: Heating status lamp
12VDC (① : +)

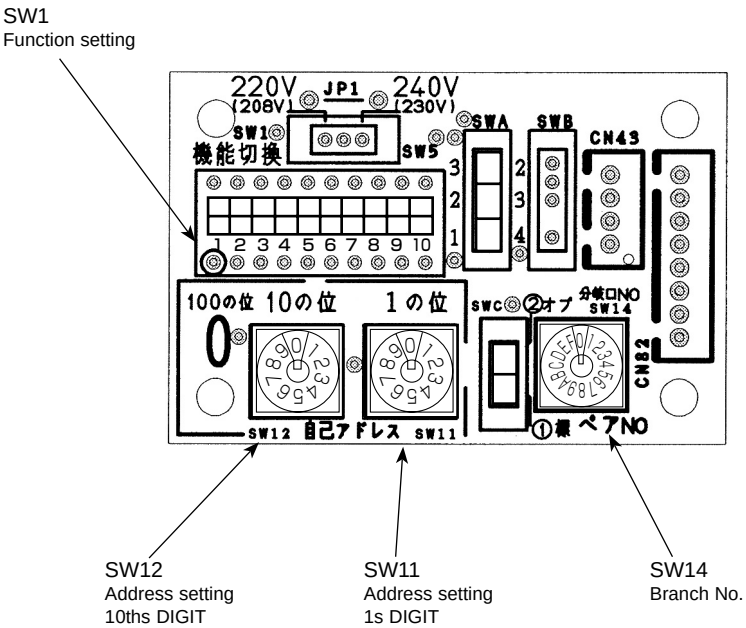
CN51
Centrally control
①-② : Control signal
12VDC pulse input (① : +)
③-④ : Operation indicator
12VDC (③ : +)
③-⑤ : Malfunction indicator
12VDC (③ : +)

LD SWE (B)
Connect to the indoor controller board (I.B)

7-3-2. Wireless remote controller board
PKFY-P08NHMU-E2
PKFY-P12NHMU-E2
PKFY-P15NHMU-E2
PKFY-P18NHMU-E2



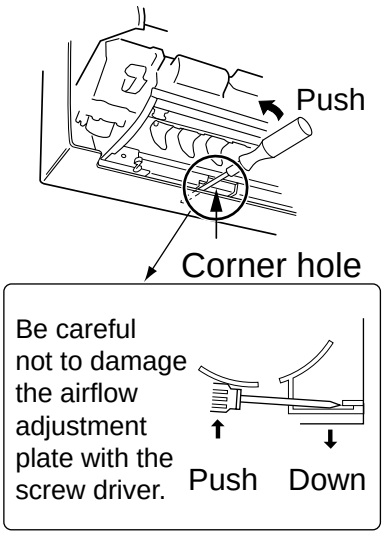
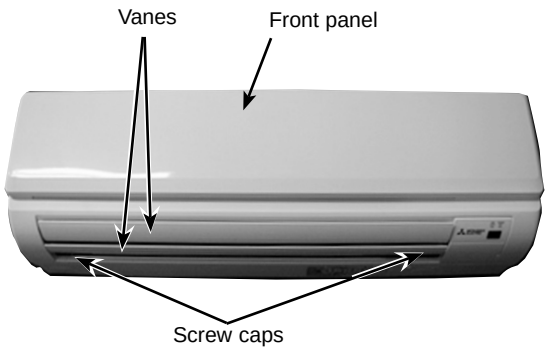
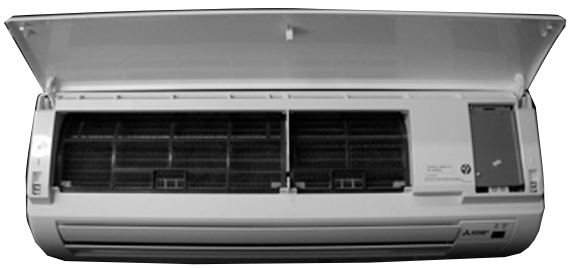
7-3-3. Address board
PKFY-P08NHMU-E2
PKFY-P12NHMU-E2
PKFY-P15NHMU-E2
PKFY-P18NHMU-E2

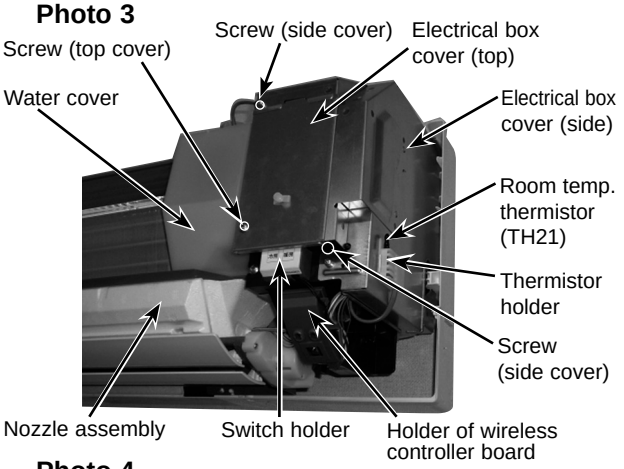
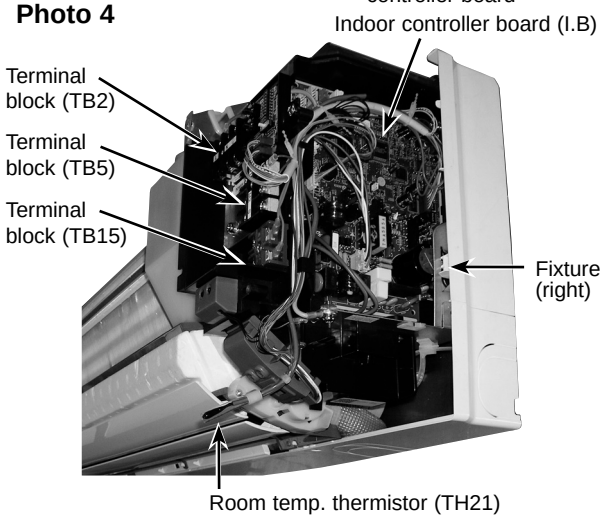
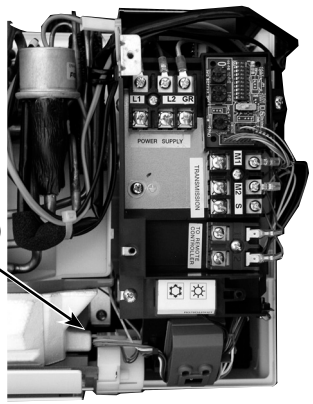


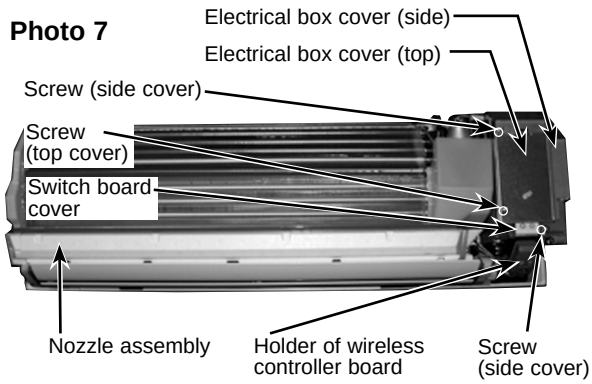
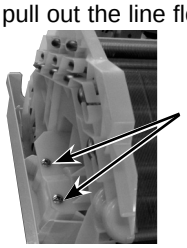
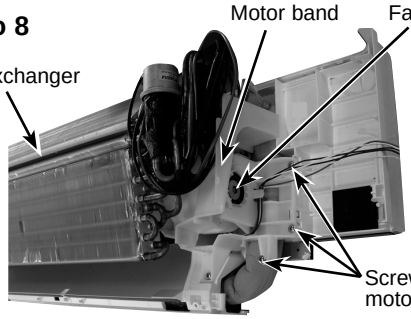
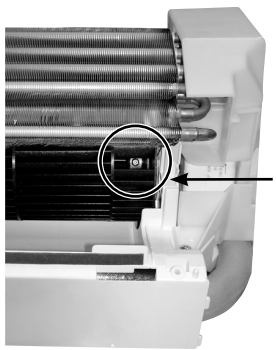
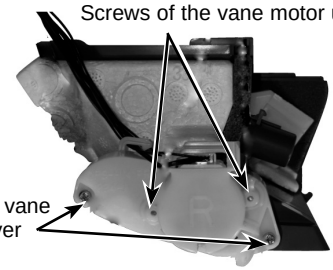
8 DISASSEMBLY PROCEDURE

PKFY-P08NHMU-E2 **PKFY-P12NHMU-E2**
PKFY-P15NHMU-E2 **PKFY-P18NHMU-E2**

Be careful when removing heavy parts.

OPERATION PROCEDURE	PHOTOS & ILLUSTRATIONS
1. REMOVING THE LOWER SIDE OF THE INDOOR UNIT FROM THE INSTALLATION PLATE (1) Remove the front panel. (2) Insert the screw driver to the corner hole at both left and right side as shown in the figure 1. (3) Push it up, then pull down the lower side of indoor unit and remove the hook.	**Figure 1** 
2. REMOVING THE FRONT PANEL (1) Press and unlock the knobs on both sides of the front panel and lift the front panel until it is level. Pull the hinges forward to remove the front panel. (See Photo 2) (2) Move the horizontal vanes in a downward direction. (3) Remove the screw caps of the panel. Remove the screws. (See Photo 1) (4) Hold the lower part of both ends of the panel and pull it slightly toward you, and then remove the panel by pushing it upward.	**Photo 1**  **Photo 2** 

OPERATION PROCEDURE	PHOTOS
3. REMOVING THE INDOOR CONTROLLER BOARD AND WIRELESS CONTROLLER BOARD (1) Remove the front panel. (Refer to procedure 2) (2) Remove the electrical box covers (screw 4 × 12). (See Photo 3) (3) Remove the thermistor holder from the electrical box side cover. (See Photo 3) (4) Disconnect the connectors on the indoor controller board. (5) Remove the switch board cover. (6) Pull out the indoor controller board toward you, then disconnect the rest of connectors. Remove the indoor controller board and switch board. (7) Remove the holder of wireless controller board. (8) Disconnect the connector of wireless controller board and remove the wireless controller board from the holder.	**Photo 3**  **Photo 4** 
4. REMOVING THE ELECTRICAL BOX (1) Remove the front panel. (Refer to procedure 2) (2) Remove the electrical box covers. (See Photo 3) (3) Remove the nozzle assembly. (Refer to procedure 5) (4) Disconnect the transmission wiring of TB5. (5) Disconnect the power supply wiring of TB2. (6) Disconnect the wiring of MA-remote controller (TB15). (7) Disconnect the connectors on the indoor controller board. (8) Disconnect the connector for the ground wire. (See Photo 5) (9) Pull the disconnected lead wire out from the electrical box. (10) Remove the screw of electrical box. (See Photo 6) (11) Push up the upper fixture (See Photo 5) catch to remove the box, then pull the right fixture (See Photo 4) and remove it from the box fixture.	**Photo 5** **Photo 6** 

OPERATION PROCEDURE	PHOTOS
5. REMOVING THE NOZZLE ASSEMBLY (with VANE and VANE MOTOR) AND DRAIN HOSE (1) Remove the front panel (Refer to procedure 2). (2) Remove the electrical box cover. (3) Disconnect the vane motor connector (CN151) on the indoor controller board. (4) Remove the corner box. (5) Pull the nozzle assembly and detach. (6) Push the fixture and remove the drain hose.	**Photo 7** 
6. REMOVING THE INDOOR FAN MOTOR AND THE LINE FLOW FAN (1) Remove the front panel (Refer to procedure 2) and the corner box at right lower side. (2) Remove the electrical box (Refer to procedure 4) and the nozzle assembly (Refer to procedure 5). (3) Remove the screws fixing the motor bed. (See Photo 8) (4) Loosen the screw fixing the line flow fan. (See Photo 9) (5) Remove the motor bed together with fan motor and motor band. (6) Release the hooks of the motor band. Remove the motor band. Pull out the indoor fan motor. (7) Remove the screws fixing the left side of the heat exchanger. (See Photo 10) (8) Lift the heat exchanger, and pull out the line flow fan to the lower-left. **Photo 10**  	**Photo 8**  **Photo 9** 
7. REMOVING THE VANE MOTOR (1) Remove the nozzle assembly. (Refer to procedure 5) (2) Remove the screws of the vane motor unit, and pull out the vane motor unit. (3) Remove the screws of the vane motor unit cover. (4) Remove the vane motor from the vane motor unit. (5) Disconnect the connector from the vane motor.	**Photo 11** 
8. REMOVING THE LIQUID PIPE THERMISTOR AND GAS PIPE THERMISTOR (1) Remove the front panel. (Refer to procedure 2) (2) Remove the electrical box cover. (3) Remove the motor band. (4) Cut the wiring fixed band. (5) Remove the liquid pipe thermistor and gas pipe thermistors. (6) Disconnect the connector (CN44) (CN2G) on the indoor controller board. (TH22 and TH23/CN44, TH24/CN2G)	**Photo 12**

OPERATION PROCEDURE

9. REMOVING THE HEAT EXCHANGER AND LEV

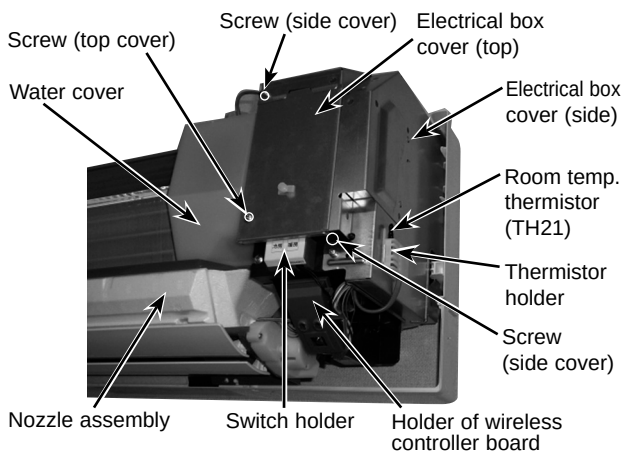
(1) Remove the front panel (Refer to procedure 2) and the corner panel at right lower side.
(2) Remove the electrical box (Refer to procedure 4) and the nozzle assembly (Refer to procedure 5).
(3) Remove the motor band.
(4) Remove the pipe thermistors (Refer to procedure 8).
(5) Disconnect the connector (CN60) on the indoor controller board and the connector for ground wire. (See Photo 5)
(6) Remove the screws fixing the left side of the heat exchanger. (See Photo 10)
(7) Remove the heat exchanger with LEV.

10. REMOVING THE ROOM TEMPERATURE THERMISTOR

(1) Remove the front panel (Refer to procedure 2).
(2) Remove the electrical box cover.
(3) Remove the room temperature thermistor.
(4) Disconnect the connector (CN20) on the indoor controller board.

NOTE: When room temp. thermistor is replaced, be sure to use service parts No. R01 N20 202.

Photo 16



PHOTOS

Photo 13

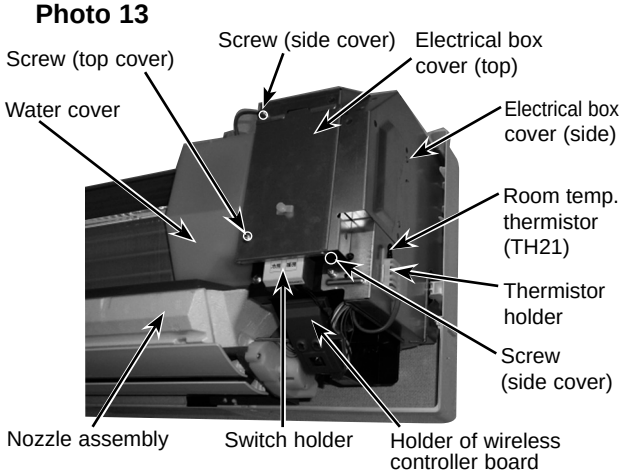


Photo 14

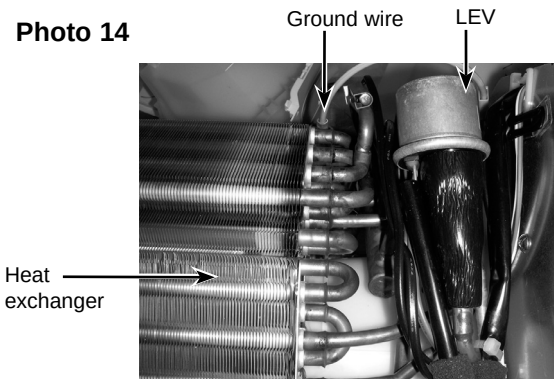
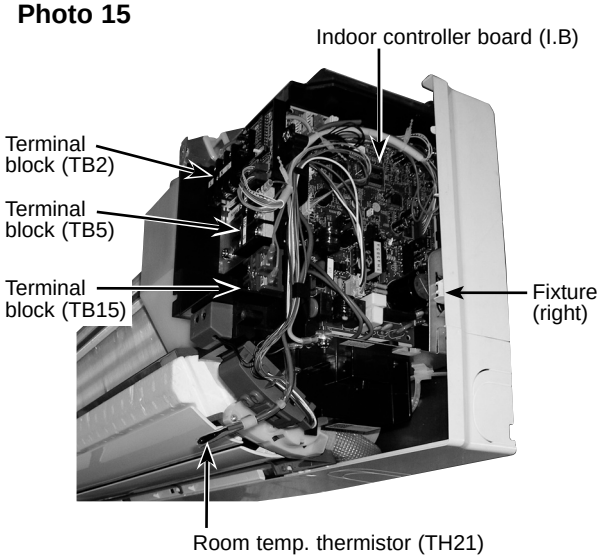


Photo 15



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